

REMARKS

The foregoing amendments and following remarks are responsive to the initial, non-final Office Action dated June 17, 2011.

Summary of Office Action

The Examiner objected to Claims 4 and 5 because of a grammatical informality. Claims 7 and 8 were objected to under 37 CFR § 1.75(c) as being in improper form because a multiple dependent claim cannot depend from any other multiple dependent claim. Claim 6 was rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Claims 1, 2, 4, and 5 were rejected under 35 U.S.C. § 102(b) as being anticipated by the Murata et al. reference (U.S. Patent No. 6,017,213). Claim 6 was rejected under 35 U.S.C. § 102(b) as being anticipated by, or in the alternative, under 35 U.S.C. § 103(a) as obvious over the Murata et al. reference.

Response Claim Objections

The Examiner objected to Claims 4 and 5 because the phrase “wherein plurality of said low-temperature gas discharge holes” should be “wherein a plurality of said low-temperature gas discharge holes.” Applicant has made the required correction, and thus, the objections to Claims 4 and 5 are believed to be overcome.

Claims 7 and 8 were objected to under 37 CFR § 1.75(c) as being in improper form because a multiple dependent claim cannot depend from any other multiple dependent claims. In particular, Claim 7 depended from Claim 6, which in turn depended from Claims 1-2, and 4-5. Furthermore, Claim 8 depended from Claims 1-2, and 4-7. By this response, Applicant has amended Claims 7 and 8, such that both of Claims 7 and 8 now depend from Claims 1-2 and 4-5, i.e., Claims 7 and 8 do not depend from multiple dependent claims.

Response to 35 U.S.C. §112 Rejections

Claim 6 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. In particular, the phrase “preferably” renders the claim indefinite

because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. Accordingly, Applicant has deleted the term “preferably” from the claim, and thus, the Examiner’s rejection under 35 U.S.C. §112, second paragraph is believed to be overcome.

Response to 35 U.S.C. §102/103 Rejections

1. Amended Claim 1

By this response, Claim 1 has been amended to emphasize novel aspects of the combustion gas extraction probe recited therein. In particular, the amendment to Claim 1 is directed toward emphasizing the fluid flow of the low-temperature gas relative to the high-temperature combustion gas.

The combustion gas extraction probe recited in amended claim 1 is operative to extract a high-temperature combustion gas while cooling the high-temperature combustion gas with a low-temperature gas. The low-temperature gas flows in a direction that is substantially perpendicular to the high-temperature combustion gas and is toward a center of a flow of the high-temperature combustion gas such that the low-temperature gas reaches a central portion of the high temperature combustion gas for mixed cooling.

Antecedent support for the amendment to Claim 1 can be found in paragraph [0029] of the patent application, reproduced in its entirety below for the Examiner’s convenience.

[0029] When cooling the high-temperature combustion gas from the above-mentioned cement kiln 2, with the probe 4 according to the present invention, the cooling air that flows in the inner tube 4a from the discharge holes 4c flows in the direction that is substantially perpendicular to the sucking direction of the high-temperature combustion gas and is toward the center of the flow of the high-temperature combustion gas with a certain amount of momentum, so that the low-temperature gas reaches to the central portion of the flow of the high-temperature combustion gas, and is mixed with the high-temperature combustion gas, which rapidly cools the high-temperature combustion gas. In addition, the low-temperature gas has no velocity vector

ingredient in a direction opposite to the flow of the combustion gas, so that exhaust gas from the cement kiln 2 that is not extracted is not cooled by the cooling air, which allows the low-temperature gas to be made high-speed and allows the velocity of the cooling air between the inner and outer tubes to be raised to a permissible limit of the pressure loss accompanying the increase in the flow velocities. As a result, the outer diameter of the probe can be held small.

As set forth below, Applicant respectfully submits that the Murata reference does not teach or suggest a combustion gas extraction probe wherein low-temperature gas reaches a central portion of a high-temperature gas flow.

2. The Murata Reference Does Not Teach Suggest or Make Obvious a Combustion Gas Extraction Probe Wherein Low-Temperature Gas Reaches a Central Portion of High Temperature Combustion Gas

As understood, the Murata reference generally relates to an apparatus for cooling exhaust gas in a kiln by-pass. Murata describes several embodiments of an apparatus including a pair of concentrically arranged flow passages for mixing cooling air CA and extracted gas GT. In a first embodiment of the apparatus, as shown in Figures 2-3, and described in Column 4, Lines 21-28, the apparatus is configured to generate a spiraling flow path for the cooling air CA. The cooling air CA mixes with the extracted gas GT at the intersection of the concentric flow paths, adjacent an end of the probe 5 (see Figure 3).

Applicant submits that the spiraling flow and introduction of the cooling air CA into the extracted gas GT differs from the flow path of the claimed low-temperature gas relative to the high-temperature combustion gas. In particular, the cooling air CA in the first embodiment of the Murata reference appears to remain on the peripheral edges of the extracted gas, and thus, does not reach the central portion of the extracted gas. The cooling air CA travels in a spiral direction within an annular channel which circumnavigates the extracted gas flow path. The annular channel defines an annular opening that extends in a plane which is substantially orthogonal to the extracted gas. Therefore, when the cooling air CA exits the annular channel, the cooling air CA is traveling in a direction which is

substantially parallel to flow path of the extracted gas, and thus, not in a direction which would allow the cooling air CA to reach a central portion of the extracted gas.

Therefore, Applicant submits that the first embodiment of the Murata apparatus does not teach or suggest every limitation of amended independent Claim 1.

Turning now to the remaining embodiments of the Murata reference, Figures 4-6 show an embodiment wherein the cooling airs CA are used for cooling the tip portion 5a of the probe 5. In this embodiment, the cooling airs CA are introduced from a plurality of holes 28 formed at the tip portion of the inner tube.

Although Murata shows that the cooling airs CA enter the inner passageway from the plurality of holes 28, Murata does not teach that the cooling airs reach a central portion of the high temperature combustion gas. Instead, it appears that the cooling airs CA only reach the peripheral portions of the inner passageway, and do not reach the central portion of the high temperature combustion gas. This is supported by Figures 5 and 6, which include arrows depicting the flow path of the cooling airs CA, such that the cooling air arrows do not reach the central portion of the high temperature combustion gas.

Further, since the cooling airs CA are introduced from several holes whose diameter are understood to be between 8 mm and 10 mm, the quantity of the cooling air CA blown from each hole appears to be small. As such, it seems that the cooling air CA does not reach the central portion of the flow of the high-temperature combustion gas, as is required by amended independent Claim 1.

The above phenomenon occurs in the same manner in the third to fifth embodiments as well. Thus, the remaining embodiments of the Murata reference do not teach or suggest all of the limitations of amended independent Claim 1.

Therefore, independent Claim 1 is believed to be allowable, as are Claims 2, and 4-8 as being dependent upon an allowable base claim.

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Conclusion

On the basis of the foregoing, Applicant respectfully submits that the stated grounds of rejection have been overcome, and that the Claims are now in condition for allowance. An early Notice of Allowance is therefore respectfully requested. Should the Examiner have any questions, the Examiner is invited to contact Applicant's counsel at the telephone number listed below.

If any additional fee is required, please charge Deposit Account Number 19-4330.

Respectfully submitted,

Date: 9/15/11

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